Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.comdoi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Evaluation of serum electrolyte status among healthy individuals and newly diagnosed cases of pulmonary tuberculosis

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ABSTRACT:
Background: Tuberculosis (TB) is an infectious disease caused by Mycobacterium, which generally affects the lungs but also can affect the other parts of the body. Electrolyte imbalance can lead to impaired functions of heart, nervous system, muscular system as well as it leads to acid-base derangements. Hence; the present study was conducted for evaluating the serum electrolyte status among healthy individuals and newly diagnosed cases of pulmonary tuberculosis. **Materials & methods:** A total of 50 newly diagnosed cases of pulmonary tuberculosis were included as study group. Another set of age and gender-matched 50 subjects were enrolled as control group. Complete demographic and clinical details of all the subjects were obtained. All the subjects were recalled in the morning and blood samples were obtained. All the samples were sent to laboratory for assessment of serum electrolyte levels. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. **Results:** Mean serum sodium levels among patients of the control group and pulmonary TB group was 141.5 mmol/L and 121.6 mmol/L respectively. Mean serum potassium levels among patients of the control group and pulmonary TB group was 4.3 mmol/L and 3.1 mmol/L respectively. Mean serum bicarbonate levels among patients of the control group and pulmonary TB group was 21.5 mmol/L and 18.4 mmol/L respectively. Mean serum chloride levels among patients of the control group and pulmonary TB group was 102.5 mmol/L and 95.4 mmol/L respectively. Mean serum sodium, potassium, chloride and bicarbonate levels were significantly reduced in pulmonary TB patients. **Conclusion:** From the above results, the authors conclude that serum electrolyte profile is significantly deranged among patients with pulmonary TB.
Key words: Pulmonary tuberculosis, Electrolyte.

Received: 14, January 2021 Accepted: 17 February, 2021

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This article may be cited as: Chahar AS, Singh MK, Saini VS, Chauhan N, Shakya P. Evaluation of serum electrolyte status among healthy individuals and newly diagnosed cases of pulmonary tuberculosis. J Adv Med Dent Scie Res 2021;9(3):38-40.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium, which generally affects the lungs but also can affect the other parts of the body. The classical symptoms of active pulmonary TB include chronic productive cough with blood-stained sputum, fever, night sweats, and weight loss. TB is a major cause of morbidity, disability, and death. It accounts for 2–3 million deaths per annum globally. One-third of the world population has been exposed to the TB bacterium, and new infection occurs at a rate of one per second. In 2006, a total of 1.7 million people died

of TB. India is the country with high burden of TB with WHO statistics for the year 2013 estimated incidence of 2.1 million cases of TB in India out of global incidence of 9 million.[1-3]

Electrolyte imbalance can lead to impaired functions of heart, nervous system, muscular system as well as it leads to acid-base derangements. Decreased sodium electrolyte is the most common and frequent cause of electrolyte imbalance in all newly diagnosed tuberculosis patients. Sodium concentration less than 136mmol/L was termed as hyponatremia and less than 115mmol/L as severe hyponatremia which is life threatening.[4-6]

Hence; the present study was conducted for evaluating the serum electrolyte status among healthy individuals and newly diagnosed cases of pulmonary tuberculosis

MATERIALS & METHODS

The present study was conducted with the aim of evaluating the serum electrolyte status among healthy individuals and newly diagnosed cases of pulmonary tuberculosis. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 50 newly diagnosed cases of pulmonary tuberculosis were included as study group. Another set of age and gender-matched 50 subjects were enrolled as control group. Complete demographic and clinical details of all the subjects were obtained. All the subjects were recalled in the morning and blood samples were obtained. All the samples were sent to laboratory for assessment of serum electrolyte levels. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Mann-Whitney U test was used for evaluation of level of significance.

RESULTS

Mean age of the patients of the control group and pulmonary TB group was 42.5 years and 43.5 years respectively. Mean serum sodium levels among patients of the control group and pulmonary TB group was 141.5 mmol/L and 121.6 mmol/L respectively. Mean serum potassium levels among patients of the control group and pulmonary TB group was 4.3 mmol/L and 3.1 mmol/L respectively. Mean serum bicarbonate levels among patients of the control group and pulmonary TB group was 21.5 mmol/L and 18.4 mmol/L respectively. Mean serum chloride levels among patients of the control group and pulmonary TB group was 102.5 mmol/L and 95.4 mmol/L respectively. Mean serum sodium, potassium, chloride and bicarbonate levels were significantly reduced in pulmonary TB patients.

Table 1: Demographic profile

Variable	Healthy subjects	Pulmonary TB subjects
Mean age (years)	42.5	43.5
Males (%)	56	60
Females (%)	44	40

Table 2: Comparison of electrolyte levels

Serum electrolyte	Healthy subjects	Pulmonary TB subjects	p- value
Serum sodium (mmol/L)	141.5	121.6	0.00*
Serum potassium (mmol/L)	4.3	3.1	0.02*
Chloride (mmol/L)	102.5	95.4	0.00*
Bicarbonate (mml/L)	21.5	18.4	0.01*

*: Significant

DISCUSSION

Tuberculosis is a major cause of morbidity, disability and death. It accounts for 2–3 million deaths per annum, globally. One third of the World population has been exposed to the TB bacterium, and new infections occur at a rate of one per second. In 2006, a total of 1.7 million people died of TB including 231,000 people with HIV.[5-7]

Effective treatment substantially reduces or eliminates disease transmission from smear-positive patients in less than one month after treatment initiation. Electrolytes loss in TB can be attributed to diarrhoea, vomiting and excessive sweating. This fluid and acid-base derangements can lead to acute renal failure, 5 hence require appropriate management.[7-9]

In the present study, mean age of the patients of the control group and pulmonary TB group was 42.5 years and 43.5 years respectively. Mean serum sodium levels among patients of the control group and pulmonary TB group was 141.5 mmol/L and 121.6 mmol/L respectively. Mean serum potassium levels among patients of the control group and pulmonary TB group was 4.3 mmol/L and 3.1 mmol/L respectively. Jonaidi Jafari N et al evaluated of patients with PTB and hyponatremia. They evaluated patients with diagnosis of secondary PTB who have been admitted to Baqiyatallah hospital. The diagnosis of PTB was based on the appearance of acid fast bacilli in sputum smears or sputum cultures, without any evidence of miliary TB. The mean age was 59.22 ± 20.57 years and 91 (45.5%) patients were male. The mean serum sodium concentration was 134.54 ± 4.95 mmol/L and more than half of subjects (51%) have shown hyponatremia. The mean age difference between hyponatremic and eunatremic groups was statistically significant (61.95 versus 56.02 years) (P = 0.047). No significant relationship was found between hyponatremia and gender, anti-TB medications and co-morbidity conditions. An older age was suggested as an important predisposing factor for hyponatremia in patients with PTB which had been observed as less of a determinant.[9]

In the present study, mean serum bicarbonate levels among patients of the control group and pulmonary TB group was 21.5 mmol/L and 18.4 mmol/L respectively. Mean serum chloride levels among patients of the control group and pulmonary TB group was 102.5 mmol/L and 95.4 mmol/L respectively. Mean serum sodium, potassium, chloride and bicarbonate levels were significantly reduced in

pulmonary TB patients. Patil L et al assessed the electrolyte imbalance among newly diagnosed tuberculosis patients. 50 participants were enrolled and assessed for demographic data, serum electrolytes and bicarbonate levels and compared with Tuberculosis patients before and after treatment. The electrolyte imbalance in terms of decrease in sodium, potassium chloride and bicarbonate values was significantly associate ($p<0.001$) with tuberculosis. Treatment with antitubercular drugs (Streptomycin, Refampicin, Isoniazide) normalized sodium, potassium and bicarbonate levels significantly compared to values before treatment. The odds of having hyponatrimia and low bicarbonate level were 2.57 times as compared to after treatment of TB patients. After treatment with antitubercular drugs, electrolyte levels returned to normal. Because of the high incidence of the electrolyte disturbances in tuberculosis patients, close monitoring and aggressive management are mandatory.[10]

CONCLUSION

From the above results, the authors conclude that serum electrolyte profile is significantly deranged among patients with pulmonary TB.

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